

CORRECTION FOR CRT RASTER

This invention relates to video display apparatus and, in particular, to electron beam landing error correction for a video display apparatus cathode ray tube.

5 Cathode ray tubes used in color video display apparatus, such as television receivers or computer monitors, incorporate an electron gun assembly that typically produces three electron beams that respectively illuminate red, green and blue phosphor elements on a
10 display screen of the cathode ray tube. The electron beams exit the electron gun assembly oriented in either a triangular, i.e., delta, configuration or horizontally aligned in an in-line configuration. The beams are deflected or scanned to form a raster on the cathode ray
15 tube display screen by electromagnetic fields produced by deflection currents flowing in the deflection windings of a deflection yoke. In a self-converging deflection yoke, the magnetic fields produced by the deflection windings comprise field harmonics selected to produce substantial
20 convergence of the three electron beams at all locations on the display screen. Proper performance of the self-converging yoke requires that beam purity and static or screen center convergence are correctly adjusted during assembly of the video display apparatus.

25 Purity and static convergence may be achieved by the use of a number of magnetized rings located at the rear of the deflection yoke, such as that described in U. S. Patent No. 3,725,831, issued April 3, 1973, in the name of R. L. Barbin and entitled "MAGNETIC BEAM ADJUSTING
30 ARRANGEMENTS". The rings are adjustable to produce magnetic poles of particular strengths and orientation to provide the desired purity and static convergence adjustment of the beams.

35 Purity and static convergence may also be achieved by the use of a strip of magnetizable material that is caused to be magnetized to form the desired magnetic poles. An arrangement of this type is described in U. S. Patent

portion of a video display apparatus;

FIGURE 2 is a front elevational view of a cathode ray tube display screen illustrating one aspect of deflection distortion;

5 FIGURE 3 is a top plan view of a video signal display system incorporating a correction apparatus in accordance with the invention claimed in divisional application No. 8925348.8, Serial No. 2223124.

10 FIGURE 4 is a front elevational cross-sectional view of the display system shown in FIGURE 3, taken along line 4-4, illustrating the operation of the correction apparatus;

15 FIGURE 5 is a side elevational view, partially in cross-section, of a video display system incorporating a correction apparatus in accordance with the present invention; and

FIGURE 6 is a diagrammatic view of the magnetic fields produced by the correction apparatus shown in FIGURE 5.

20 Referring to FIGURE 1, a video display apparatus includes a cathode ray tube 10 incorporating an electron gun assembly 11 mounted within the neck region of the tube.

25 The electron gun assembly 11 illustratively produces three horizontally aligned electron beams which are deflected by a deflection yoke 12, located on tube 10, to form a raster on the phosphor display screen 13 of the cathode ray tube 10. Deflection yoke 12 comprises horizontal deflection coils 14 and vertical deflection coils 15 which respectively deflect the electron beams along horizontal and vertical deflection axes. Yoke 12 may also include a static convergence and purity adjusting device 16, which
30 illustratively is embodied as a flexible strip of magnetizable material that is magnetized to have magnetic zones of particular strengths and orientation to effect purity and center convergence of the electron beams on the
35 display screen 13.

 The video information signal is illustratively provided to video signal processor 17 via red, green and blue video signal input conductors, designated R, G, B,

blue, electron beams in a static convergence device such as is described in the aforementioned U. S. Patent No.

3,725,831. FIGURE 3 illustrates a display system 24 comprising a cathode ray tube 25 and a deflection yoke 26, such as that described with reference to FIGURE 1. A flexible strip 27 of magnetizable material comprises two-pole, four-pole and six-pole magnetized regions, designated T, F, S, respectively, to effect static or center convergence and purity of the blue, green and red electron beams 30, 31, and 32 on the tube display screen 33.

In accordance with the invention of the Divisional Application, an additional four-pole region 34 is magnetized into strip 27 to effect correction of the previously described blue bow beam separation or misconvergence. The effect of four-pole region 34 is to correct the angle of the beams as they enter the fields produced by deflection yoke 26 as shown in FIGURE 4. Since the static convergence four-pole field will also change the angle of the beams, it is desirable for maximum correction effect to provide as much separation as possible between the static convergence four-pole region and the blue-bow four-pole region on strip 27. FIGURE 4 illustrates a representative magnetization arrangement for the misalignment shown. A misalignment in which beam 32 is high and beam 36 is low would require reversals of the north and south poles N and S. The strength of the poles is determined by the degree of misalignment, i.e., the amount of misconvergence to be corrected.

In some display systems utilizing magnetic strip static convergence and purity devices, so called beam-benders, there may be insufficient space on the strip to accommodate an additional magnetic zone, and insufficient space on the deflection yoke or cathode ray tube to add additional strip material. In accordance with the present invention, FIGURE 5 illustrates a display system 35 comprising a cathode ray tube 36 and a deflection yoke 37. A magnetizable strip beam bender 40 located at the rear of yoke 37, includes

The previously described arrangement incorporates separate pieces of magnetizable material for members 50. Members 50 could also be incorporated as part of beam bender strip 40, in which the beam bender material would be formed to resemble in appearance a toothed structure, with predetermined spaced extended portions that would extend into the recesses 47 of insulator 48.

Blue bow correction via magnetizable members 50 may also be accomplished in a display system that utilizes a beam bender comprising individual or discrete magnetic rings, such as that shown in U. S. Patent No. 3,725,831. An embodiment of the invention of that type would require a magnetizer having only two magnetizing coils.